<table>
<thead>
<tr>
<th>Title</th>
<th>Diseases among colliers</th>
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<tbody>
<tr>
<td>Author</td>
<td>Murray, William</td>
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<tr>
<td>Qualification</td>
<td>MD</td>
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<tr>
<td>Year</td>
<td>1892</td>
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</tbody>
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Thesis scanned from best copy available: may contain faint or blurred text, and/or cropped or missing pages.

Digitisation notes:

- Page number 13 is missing in the original thesis.
For nearly twelve years I have performed the duties of a surgeon to the Parkfield Collieries, where between 600 and 1000 men and boys are employed. In this thesis, I propose pointing out the mode of life of these men, their surroundings and diseases from which they suffer and die, and as far as I can, their etiological connection. In many instances, I can not furnish statistical data; nor do I imagine would figures on such a small scale be of any practical use. I much more regret the difficulty of obtaining post-mortem examination in order to verify results; but this regret I must share with many others in private practice, owing to a false but pardonable and tenable existing very generally in the minds of the public.

The day of a working miner naturally divides itself into two parts, working and remaining. As many of the miners live one, two, three miles, or even further from the pit, and they require to be at the pit-bank about six a.m. they require to get up for half-past four till nine o'clock in the morning. Most of them take tea, bread and butter before starting for their work; and they go on with their work till nine or ten when they partake of tea again with bread and milk, bread and meat, or some may vary that by taking milk. Again, work proceeds till half-past twelve, and the same kind of food is eaten. At 1.30 p.m. work is resumed till four p.m. when they come up and go home. No intoxicant is the form of alcohol in
allowed on the works, hence tea chiefly, & cocoa, or milk from the staple beverages. The tea is taken strong & black, very often of an inferior quality. Smoking is allowed, and most avoid the use of the permission. They now work ten hours between bank and bank, except on Saturdays when they work only eight. This has obtained during the winter months only, from the late end of September till the beginning of April. During the summer months the day of labour have varied from 5, 4, 3, & even 2.

There is, however, another shift of men who do repairs only, and who work from 10 p.m. till 5 a.m. between banks. They have only one meal during the night which is of the kind men named above, and during the day at home they have their food like the labourers. Most of them go to bed at home. There is no alternation of shifts, except among those connected with the engines and the stables. The day-men are always day-men, and the night-men always night-men. In consequence of this arrangement, the men who work by day during the depth of winter never see the sun except Saturday afternoon for an hour or two, and Sunday.

Paleness of skin is characteristic of mines in this locality, and I cannot attribute it to no other cause than want of exposure to sun light.

When the men arrive home, they mostly wash all over with soap and warm water, and dry their other clothes, nearly every man keeping a separate suit for pit work. The skin is thoroughly clean & healthy, and reacts to difference of temperature very efficiently. The meals now partaking of is the principal on the day consisting of meat 2 or 3 pounds of corn with vegetables, frequently with potatoes, and always with a dessert of fruit. As many of the men under my care are sober men, the evening is spent about home, and finished up in the great majority of
cases by bread & cheese & half a pint of beer before going down which is a brief account of the average miner's day in relation to work, food, and rest, amongst those with whom I am connected.

The home itself is as a rule superior to that of the same class of men in the North. There are few one-storied houses, the rooms are of a fair size, and the bedrooms are usually sufficient in amount for an upper story. Ventilation is good by day and night. Cleaning is done general in persons, clothes & house. Ornamentation in the shape of prints and pictures is common, and every one has his flower patch or border in the garden; while many are adepts in the art of raising vegetables & flower plants in small green houses erected by themselves. There may appear to be small matters, but they all are included in the small total of the miner's life, and have a definite influence on character, duration of life & income.

The pits are situated in the eastern borders of the Bristol Coalfield. The strata lie in the form of a basin in the centre of which, for the greater part of the last 12 years, the work has been carried on. On account of great lateral pressure, these strata are much broken & distorted; and therefore the working are immense & require much attention & skill. The seams of coal vary from 2 ft. to 4 ft. in thickness, & from an being worked at different levels. The pits are 300 yards in depth, but most of the present workings are at least 100 yards deeper. Although the coal is bituminous & a good gas producer there is practically no gas in the pit mine & naked lights, chiefly candles, are used. As the men live practically one third of their time in the mine during winter, and a small varying portion of it in summer, the ventilation becomes a matter of great importance.

In regard to quantity of air I may state that the amount passing down the pit varies from 26,000 to 35,000 cubic feet per minute—allowing for 600, the amount would be about 60 ft. 8 in. 500 eft. per minute per head. But candles
Lamps, 30-40 horses, & engine must all be allowed for. On the other hand, the measurement is made by anemometers to give rate, and multiplied into area of section of the pit to give c. ft.; and every one knows that the experimental error in this observation must be considerable. I have on several occasions examined the air & estimated the amount of carbonic acid, which never exceeded 0.00635 per 1000; of course I mean the air at the face with the main air working. The amount of organic matter in the same specimens, estimated by the albuminoid ammonia process of Wartely, was on several occasions considerable. The highest was 3.97 per cent per metre. So that the air in this mine may be called good, if compared with some of the specimens from other mines, where August Smith finds the oxygen to be 20.8 per cent. and the carbonic acid amount to 0.785 per 1000. As we will see afterwards, where, by the respirating apparatus are as rare among the workers in Parkfield as among a similar population working above ground.

Three men who work with gunpowder and other explosives, the branches are they are called, are an exception to the above statement. Up till recently, gunpowder alone was used, but recently as frequent various explosives have been tried. How to understand the position accurately it is necessary to premise that branching is done by contract. The air is carried down a branch by pipes of sheet iron, and necessaries their pipes are not always close to the face. The men are of course induced to come as near as possible by using their time to the best advantage, and thus they often flush down to the face before the gases have had time to escape or be properly diluted at the face. Then they must breathe air ad-
admired mixture largely with the products of combustion of the explosive used. The products of gunpowder combustion are well-known, comprising chiefly carbonic acid, oxide, sulphurous acid and water, compounds. I have seen only a good many, if not all, of the old branches有些...

Considering the question of air supply to these men, we may say that they live in an atmosphere at least as good if not much better than the dwellers in house, etc., and if we take the whole twenty-four hours into consideration, the amount of oxygen possible to them is very much greater than to the very poor in our cities, who are bunched together at night while the sleeping accommodation is scanty.

Now, may say that they are better off than the upper ten who crowd saloons for hours together in the glow of gas while vitiate the air to an enormous extent, already deteriorated by the products of human excretion and the stinks of so-called perfumes.

I have mentioned generally the food they eat, the work they do, the air they breathe, and I must now mention in the same way the water they drink. With regard to clothes, there is little to say, and I may dismiss it by stating that flannel is usually worn next the skin, and that other...
I have already said that the rainfall again varies over a wide area, but the water-carrying strata are generally the same. Sometimes
or less overlying mud and sandstone, with layers of peat or humour or cropping to the surface here and there is the general
character of these strata. The result is that in certain parts of the
district land water of a soft nature is found, in others very hard
water; in others hard water containing a good deal of magnesium
water. Take as examples the three following:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Desulphurised</th>
<th>Organic Carbon</th>
<th>Organic Ammonium</th>
<th>Nitrate</th>
<th>Chlorine</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31.05</td>
<td>0.068</td>
<td>0.030</td>
<td>0.017</td>
<td>0.039</td>
<td>15.1</td>
</tr>
<tr>
<td>2</td>
<td>31.84</td>
<td>0.062</td>
<td>0.039</td>
<td>0.014</td>
<td>0.044</td>
<td>15.9</td>
</tr>
<tr>
<td>3</td>
<td>31.61</td>
<td>0.082</td>
<td>0.042</td>
<td>0.017</td>
<td>0.042</td>
<td>16.1</td>
</tr>
</tbody>
</table>

This water, aside from the present series of old unnamed iron
mines and leads to overflow into the River Frome. The water company
was set up to supply a large area containing many prosperous villages
whose supply was known to contain many polluted wells.

The analysis of the Bristol water is as under:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saline Ammonia</td>
<td>0.001</td>
</tr>
<tr>
<td>Albumin</td>
<td>0.005</td>
</tr>
<tr>
<td>Nitrate</td>
<td>0.08</td>
</tr>
<tr>
<td>Chlorine</td>
<td>1.02</td>
</tr>
<tr>
<td>Oxyan absorbed in 4 hr</td>
<td>0.045</td>
</tr>
<tr>
<td>Total hardness</td>
<td>16</td>
</tr>
<tr>
<td>Permanent hardness</td>
<td>3.5</td>
</tr>
</tbody>
</table>

I have examined this water 3 times, 3 long days past, but always found it 19
In one particular district I examined the water of many wells and found the quantity of magnesian salts a distinctive characteristic. The following is the result of one examination and a fair example of the whole. This water is pumped up halfway down the pit out of a stratum of permanent, and supplies about 250 families. The analysis is given in grains per gallon.

Ammonia albumin acetate. | Chloride | Magnesia | Sulphate | Trace
---|---|---|---|---
0.05 | 2.02 | 30.0 | 0.02 | 0.02

Total hardness Temporary | Permanent | CaO MgO
---|---|---
19.1 | 14.5 | 4.1 | 9.2

The hardness here is the objectionable point; and the amount of magnesia I consider makes the objection greater. Fortunately the water is good.

Such being the environment of this population over two mines, it is now my business to trace their effects upon their organisms.

The minor ailments which at the end lead to the more important are not always easily diagnosed; and at first I found them more difficult to deal with than seemingly more important diseases. I have to keep an open surgery for three hours daily, and the exigencies of the practice require rapid diagnosis which is apt to lead to slovenly habits and great inaccuracies. Besides being one’s thoughts to run in pits, especially in regard to treatment. I attended the out-door practice of the dispensary, and the Fountainsbridge dispensary much more diligently than the average student of my time; and yet for a long time I found three hours the most burdensome of the day. The system of benefit societies renders this work very responsible work for upon the opinions the surgeon at times
depends the liability of the Society for such cases. As (8)
Careless or ignorant Surgeons, or one without the courage of his o
Junior would place any benefit Society by giving way to such
Surgeons. Hence the very work which has to be done and
the most disadvantageous circumstances come to the
more important financial to these Societies, and through
them to the individual members who compose them: This work is just the work which the University training
in my time did not fit me for; and had it not been for
the perseverance of Dr Murdoch Brown at the Fountain-
bridge Dispensary in urging the students to attend to minor
ailments chiefly, I would have been more unfit than I was.
It does not require much clinical acumen to recognise the
well-marked disease seen in our large Hospitals; but it require
a great deal of that acumen and carefully for more profound
knowledge to recognise and treat the common ills of every day
life. Now the Dispensary practice is frequently taken by
Students as a period in their Career when they are quite un-
fitted to benefit by it. This is a matter that cannot easily be
remedied; and the rank and file of Scotch Students who em-
igrate to England to practice would thereby be placed on a level
with their English competitors from the very beginning; while
the more profound scientific training they get, as the Uni-
versity of Edinburgh at least, would soon enable them to
rise above them with more qualifications. It is true that an-
other 9 months do that for them; but while the Scotch
university is paying that experience, and making his blunders,
the English Hospital training man in paying his footing and the
form. has lost his opportunity for years. This is no
exaggeration. I can quote instances, and give names if needed,
to prove my position. I may be told there are plenty of opportunities
afforded for this kind of training. Looking back on levels of
14 years ago, I must question the statement; but even if
it were so, what can is taken to compel the student
to attend our door clinics. Is he ever asked a question
upon the minor ailments in the written oral or clinical ex-
amination? Nearly every student would leave a case of dys-
pepsia to go by a case of anemia or locomotion ataxia.
And who is there to tell him that the former is much more
important than the latter?

Diseases of the Digestive Organs.

As a group they are the most common, as they are everywhere.
The miner's habits of drinking strong black leather tea containing
a good deal of tannin leads to a form of dyspepsia with palpita-
tion easily recognisable. Smoking strong tobaccos in large quantities
complicates matters, but a little experience enables one to
eliminate the cases of mischief caused by tobaccos. A man
complains, for example, of fulness, distression after food, acidly,
feeling, anorexia, quickened pulse, insensible sensations which
vary according to the individual, regularity of bowels, faintness
of circulation & inspiration; I should diagnose a case of dyspepsia
with a moderate use of tobaccos. The almost total discontinuance
of tea, a little soda & rumbarle, & light micky diet for a
fortnight will put that man right. If however, with the
same symptoms, there is frequent glutine pulse, approaches
of meals toasts with some shortness of breath, the probability
of tobacco excess as a factor is present. A reduction of the amount of tobacco used, along with a week's rest must be added to the diet treatment. There is no chance of getting an old smoker to give it up altogether. And besides, I am not sure if it is advisable, for the moderate use of tobacco contracts to some extent the evil effect of the tannin contained in the tea in causing constipation.

Depression is very frequent, constipation rare. Of course it must always be remembered I speak exclusively of males.

I am not aware that these frequent attacks of depression lead to any grave forms of disease. Ulcer of the stomach has as yet been entirely absent amongst these men, and Cancer is extremely rare. Two cases of epithelialos of the tongue have occurred in my practice, both traceable to smoking, one possibly complicated by the results of the excess of his youth. At least three cases of pyloric stenosis, in all cases malignant, and one of malignant disease of the rectum. But there is no evident connection between the slight ailments of these. In fact in all three cases of malignant disease the depression was the first symptom.

Having used the word depression, I must explain that by that term I mean any simple disorder of digestion not due to a recognizable lesion, and the form I meet with is most frequently characterized by the symptoms mentioned. There are cases of depression evidently due to some form of portal obstruction or want of proper hepatic circulation. These are mostly due to constipation, or followed by it. The old
blue pill followed by a saline purge helps in these cases, followed in turn by an excesshydrochloric acid or a bitter infusion.

Now there is nothing new or original in the sickness of these cases; nor is there anything peculiar in their causation. But evidently the habit of the men lead to their complaint. And a question arises of how to avoid them. I have tried various plans. Being that the food is the food taken for two meals, or the morning meal before going out, are not easily varied as to the solid food, and that the tea is in the major part of cases. The real cause of the mischief, it is easy to suggest, that a subject elicits for the tea ought to be made; I have suggested coffee and cocoa with milk, but the men all say that they cannot work as well, and return to the tea after a short time. Alcoholic drinks are inadmissible. Water, as it is found in the fad is very impure, and the men always say that drinking pure water causes either boils or diarrhoeas. Certain facts go a long way to support that assertion. A certain amount of liquid in an absolutely essential; and I am convinced met by the question, What does your recommend me to drink? I am driven back on the advice of taking good tea properly infused. In cases where this has been done, the dyspepsia has disappeared, although the quantities have remained the same, about a quarter per week. But it is strange how constant is the preference to the old black tannin. Loaded infusions. It is not a question of taste alone for many have asserted that they prefer the tea without the tannin, but that they do not feel so well for their work after it. Can it be possible that tannin has any...
to do with that feeling of well-being? or does the length of time
regarded to bring out the tannin bring out any thing else? for
the tea having that effect? I know of nothing in the com-
position of tea that would support the miner's assertion.

The only explanation is that the men are under a delusion &
custom, driven them back to their early habits.

Diseases of the liver are rare. Obstruction of portal circulation
secondary to heart disease is common enough, leading to enlargement
and secondary cancer has occurred--my practice. But forming
biliary obstruction of the liver such as hepatitis, abscess or early semi-
chronic disease of the cirrhotic type due to alcoholism I have
never met with in a mine.

Several cases of jaundice have occurred, all apparently of the
obstructive type. Three of them due to impacted gallstone. I
should imagine the hard water of the district would give rise
in the formation of gall-stones more frequently than I can work
for. It is possible that many of them may pass out of the system
without giving rise to symptoms sufficiently severe to have my
attention drawn to the case. Or the active habits of these men may
keep up the circulation in the liver in such an active condition that
deposition is impossible. However it may be, it is certain that
men living as these men do in regard to food drink & exercise, en-
joy an almost total immunity from liver diseases, namely jaundice,

Pernicious, with vomiting and abdominal pains used to be common
when I first entered upon my duties here. I noticed that I was fre-
quently called for especially during warm weather to see a patient
reported to be late ill suddenly & severely; and that when I
arrived I had more than one patient to deal with in the family
The symptoms were usually those of acute irritation of stomach and bowels, vomiting, retching, severe pain in head, stomach, abdomen, with cold clammy perspiration and sudden onset. Dinner had usually consisted of pork, green vegetables, potatoes. The usual strong black tea had been taken about 2 or 3 hours afterwards, and the pain usually began about an hour after the tea. A study of a few of these cases led me to teach these people to avoid such a diet or rather such a combination, and to me it is very material. The result is that such cases are much less common. I never had any deaths from this cause, but in some instances the amount of poison generated and absorbed left the patient weak for some time. I believe the same early, as while the irritation gave pain to the pain in both stomach and bowels gave no time for the generation or absorption of the poisonous which I believe to be the active agent causing collapse and death in such cases. Unless nature had evacuated the stomach before my arrival, I always administered plenty of warm water, with either gine sulphate or alopecuronia with a strong dose of castor oil before as soon as the stomach would retain it. This seems to be harsh treatment, and a return to an old plan now fallen into disuse. But other plans failed, and this one always succeeded. May more it is based on a good sound principle. Given a material causing irritation and from its decomposition liable to give rise to symptoms of poisoning, the obvious indication of treatment is to get rid of it as soon as possible.

I may say before leaving this stage that the quantity eaten always had made an element in this trouble. But whether or not we admit this, the result was the imposition of what the stomach could not digest, and at the same time was easy to decompose into
In this connection I had better take up the subject of typhoid fever. The local lesion is in the digestive tract, and I do not intend to shun anything today about the other members of the zymotic group of diseases for their connection with my subject is not very evident. I may except influenza also.

I have had only one out-break of typhoid fever to deal with, and only one of twenty-eight cases was not clearly traced. In the summer of 1888 a case was imported into the village of Mangostield where the water-supply was chiefly derived from wells, many of which were polluted. I had condemned years before the public supply of the West Gloucester Water Company was only in process of being laid down and had not then reached the village. I urged the company to hasten on their works to this village, but the supply was not available till the summer of the following year. Meanwhile isolation of the case as far as possible, disinfection of crocks, persons & clothing, a second disinfection of crocks before burial in the garden were all ordered; and, as far as possible, I watched the carrying out of them in execution. They were, however, eluded. I also closed the well's supply after having found it impure. The result was that no other cases arose till October. There was a good deal of heavy rain in September; the crocks had been buried about 20 feet from the well mentioned, which was the furthest available point, and the well had been in use by five different families before I knew of it. I closed the well again at once, but the mischief was done. The rains had no doubt carried the germs from the crocks, which were
not always properly disinfected into the well, through its dry-
stone wall; the polluted water would form a good cultivation
medium; and hence arose 9 new cases. Two families in the
same row of houses used water from a distance of a good quarte-
ter were the only ones not affected. One of 9 cases lived in a
different part of the village and served as a focus for 3
other cases. One more case arose from the original source: the
other died, one from debility caused by free & recurrent epistaxis,
one from delirium ending in coma, and one from other exhaustion.
Thus ended the outbreak in this village. Meanwhile the public
water supply was completely and almost universally used.
In the following summer one case arose in another village about
two miles off. As the communications between the village were
frequent & intimate, both being mining villages whose inhabitants
brought at the same pits, one naturally sought for the source
of this case in the immediately anterior outbreak. But no satis-
factory connection could be traced, and eventually it was found
in another quarter. Nine new cases were most satisfactorily proved
to have arisen from this one - the lack of connection being again
a popular but polluted well. Out of nine houses using this
water only one escaped, and this one discontinued its use for
some time for some other reason without meeting with the same
The only death affected was a testoterale who had always drunk
full of the water, and who died of peroration: he was the
only testoterale in the group. A ditch, dry for the most part
in summer, except for the seeping from open middens
ran behind the houses & in dangerous proximity to this well.
On calling this ditch, the chlorine was increased in the water.
from 4.5 gos per gallon to 8.2 gos per gallon, showing the possibility of contamination. The alburnumod ammonium was 0.5 grain per gallon. Nitrate and nitrates were both present, showing actual contamination. Yet this water had been used for years, and was actually a popular source of supply. It would have been extensively used in the village but for the fact that it lay at the bottom of a steep incline, and the consequence would have been disastrous. One other case arose in the late autumn, which I was not able to trace, but no other case occurred as a consequence.

This outbreak shows that under ordinary circumstances typhoid fever is not carried out about on a wide scale, with large numbers are assembled together, or I should rather say that the assemblage of large numbers of men in a poor district when some of them come from infected households does not necessarily cause a spread of typhoid fever. It is otherwise with scarlet fever, of small-pox I have no experience. I mentioned influenza. That disease did not spread in the usual way. In this neighborhood it first appeared at Bristol, and gradually got to the outskirts. Staplefield is a populous place just outside the boundaries of the city. Several foci appeared at once, and in 1874 very few escaped, but the incidence was lighter on the young. Even shops, ears, horses & pigs suffered. The village of Mansefield is a mile further out of town, and the epidemic began there, where it was about our. In Staplefield. The same course was followed by it along that same road, and also along two other routes, outwards from Bristol. In the two following years the epidemics were much lighter, but exactly the same incidence both places. I think, too, a certain amount of intensity of the poison is required before an epidemic arises, and that that intensity acquires force in circles. It does not seem to agree with the facts to suppose that it travels along lines.
always thought of the heather burning on the Scotch hillsides, as an apt illustration of what I mean by the invidence of influenzal hire. However that may be, the assemblage of men in the that carrying did not act as a means of communication to spread this disease, for its spread was entirely out of relation to the fair as a custom. I am quite aware that the notion of influenza travels along the lines of communication, but it leaves its mark here and there, and we have a circle moving here and there, constituting an infected area all along the route, only where a strong wind, in the form of whirlwind, or anomaly has been prevalent.

Respiratory diseases

In former days, and in the Cornish mines of the present day, respiratory diseases, having destruction of lung tissue as their basis, and ending in some form of phthisis, were common. The ordinary coal-mine of the present day is not more liable to phthisis than the ancient working above ground. The usual aids to the reception of phthisis, such as air loaded with impure gases or dust, are present in no larger quantity than in the air of many of our towns. The arrangements are such that fresh air goes down the pit, and that it supplies the men at the working faces before it is used up in any other way. This is the rule. The men who are meeting the branches, and those who keep the air-warp open in those subjects most frequently to foul air, so that there is always a considerable number. In mines producing much gas, damp or other noxious gases the condition is different, but as Parkes said in practice, these gases are as follows:—

Phthisis

Deaths Rate per 1,000
34. 2.3 per cent.

Respiratory

Disease

49. 3.31.

83 deaths out of 446 or 18.8 per cent. One third are due to respiratory disease, phthisis.

The population consist of miners and their families; and still more largely of shovemakers, many of whom work in factories, and many more at home in close, ill-ventilated workshops. The females work as carcase-makers, brewers' and laundresses, &c., in the various parts of shovemaking. The high mortality from respiratory disease is large. Deducting them we have a reduced mortality among miners from respiratory disease. But we must add to this again by taking into consideration the fact that miners are usually paid cash men; for if a youth cannot do his work in a mine, he usually leaves the work and takes to shoemaking.

In this neighbourhood I am quite sure that deaths from phthisis are less frequent than among the similar class of operatives over England and Wales. I have not met with a single case of phthisis among the miners except where a well-marked hereditary predisposition prevailed; nor can I point to a single case in which the mode of life and surroundings of the miners influenced the result. I am partly inclined to think that of two members of a family equally predisposed the one who takes to his work has a better chance than his brother who takes to other employment available within his reach of life. This last consideration is a most important one, and one that must be reckoned with in dealing with large numbers of people in such a climate as ours. Let us start with the general accepted fact that the tubercle bacillus is the constant companion...
cause of pulmonary phthisis. The bacillus has no power to invade perfectly healthy tissues. Make it that if the epithelium covering the mucous membrane of the air passage, the bronchial, is perfect you may breathe it out with bacilli without any ill effect. But give a breach of our jaw - a want of continuity of the epithelium, and the result then depends on the comparative strength of the bacilli to the tissue cells with which they are in contact. So that so far as I am at present concerned with the subject I have two questions to answer. Are the miners' air passage, subjected to stronger or more numerous bacilli - (2) Are the miners surroundings likely to greatly injure the tissues of the respiratory organs? Then others.

In the great majority of cases of pulmonary phthisis we have to deal with the air-borne bacilli. Now the air of a pit is derived from the outer air, and its original purity depends entirely on that of the general atmosphere, not in the air allowed to escape for motion is the chief principle of ventilation. And it is a well-known fact that movement of air is one of its chief means of purification. Through the whole of that pit by the very air at work, the air comes to them with the before mentioned exception almost the same as it enters from the outer air, only warmer and the it is being constantly changed as a necessity of the case. It therefore seems to me that miners are placed in a situation much the same as men working in a quack store on a summer day, so far as air is the considered. As evaporation of air gives rise opportunity for deposition of germ, their growth, and production of diseases arising from their growth, and concentration of other injurious agencies, no movement of air prevents them, and concludes to the reduction of the incidence of disease dependent on them.
The second question involves other considerations, but its answer lies in the question of movement of air. First consider the men working on coal. No doubt a certain amount of dust is raised in the cutting of coal, but a good cutte raises less than one would suppose. And the air rushing past the face clears it away almost at once. In many pits, smoke, damp, and fine dust push out as the face as the cutte goes on, but with this there is no connection as I have never known such to occur at Parkfield. The coal-cutter, the & the lads employed in taking away the coal & sending it to the pit-bottom are not in any way injured by the coal-dust, and we may dismiss them entirely from our consideration. In fact, experience proves what science theoretically points to viz: men living in air sufficient in quantity & constantly changing, are not liable to suffer from infective or destructive lung diseases.

We have, however, the branchers to deal with. These are the pioneers of the work. They are always working in new places where the air cannot possibly circulate so freely. The element of movement of air as an aid to purity is to some extent absent, and superadded to this condition there is the fact into account the fact that their branches are chiefly driven through harder rocks where explosives are required. We have, therefore, new circumstances to consider. 1. The continual quantity and movement of air. 2. The harder and more angular, therefore more injurious dust. 3. The gases arising from the use of explosives.

No doubt these men do suffer from respiratory disease, but strange to say, I have had not one single instance of phthisis among them. It must be understood that everything is done by the management as well as by the men themselves.
to minimize the evils of these conditions, and that every one is a much smaller evil than a Cornish mine, where many old-fashioned ways are still in vogue.

But everyone of these branchers soon or later comes under my notice. The first complaint is usually some form of dyspepsia, including such symptoms, as nausea in the morning, and pains in the stomach after meals. They usually blame the powdered smoke. They may go on for months or years intermittently. The next step is a cough with some pretty bough expectoration, chiefly coming on in the morning. And with this they may go on for years, until laid aside with an attack of acute bronchitis. In either case emphysema is the result, which may after a while send them back to coal-cutting, some light labouring employment, or stop them from work altogether. The main cause of their main line of work is always the same — the paces upset their digestive first, and then combine with the dust irritate the bronchial mucous membrane. The constant prolonged irritation with the muscular action of coughing, going on day after day leads to the emphysema; chronic bronchitis ensues, sometimes dyspnoea of a spasmodic kind, dilatation of the heart, and valvular murmurs follow in turn, and an attack of acute bronchitis most frequently ends the life.

It may be said that in this short description, I have mixed up things in a wrong order, of course if the initial stage of bronchial cough irritation is to be called bronchitis I admit it. But words will not alter the facts. The irritative stage is a curable one to a great extent and precedes the emphysema. By sending them back to coal-cutting in time, the cough alone, their & emphysema never supervene. As a matter
of fact I have frequently seen branchers to coal-cutting with
good effect, and I have at present in attendance several old
men who were branchers for years in their younger days.
I have little experience in the comparative results of different
explosives in connexion with the men's health. Gunpowder has
been used more extensively than any other, but when dynamite
will effect the purpose they desire, they prefer it. They remark
the smoke is not so injurious; and they can set off down to the face
some minute earlier than with gunpowder. That is their re-
port. I have not tried it myself. However the men declare, they
declain it would soon kill them. Don't they rather favour me.
I must say I cannot see any good chemical reason for their pre-
ference. I am, however, favoured by the management with the
promise or hire allowed to attend an experiment with several
explosives for the purpose of collecting and testing the gases
evolved.

In regard to the diseases of the respiratory organs there is
nothing particular today.

Diseases of the Nervous System.

I consider that the miners under my charge have been par-
ticularly free from nervous disorders. One case of locomotor
ataxia is all I have to report of that disease. A brother suffers
from well-marked myxoedema. One case of paralysis agitans
and three of hemiplegia (all right-sided) complete the list of
debiliments. I have just as little to say in connection with
the miners. One case of senile dementia, one of general paralysis
of the insane, and one of melancholia followed by suicide
complete the list. Miners are prone to worry, mental strain
as a class. It is their habit - this neighbourhood & fine
Circulatory Disease.

Diseases of the heart, chiefly vascular, are certainly common. And of these mitral disease is most common. This is owing to the frequency of rheumatism in an acute form. In this connection I may mention that I have been free from cases of acute bronchitis. I may also say that I firmly believe in the occurrence of the two diseases in the same person, and that somehow they are closely connected. Some of the affection of the heart are so doubtful as to bronchitis, but the bronchitis remains in these cases a prominent affection. The connection between the prevalence of rheumatism and the minor circumstances is difficult to trace. The heavy beer which is constant beverage may be one item in its causation. The constant exposure to drafts is the fact, and the moisture in the air, under foot, may be another cause. The cold change from the slightly warmer air underground to that above may also be a cause. The difference of pressure may have some influence. I am not aware that any of these causes singly would produce rheumatism. I do know that drinking beer aggravates when present, that sudden exposure to cold moist air will affect the feet, and that difference of barometric pressure affects the circulation. Possibly the combination of these causes operates in its production so frequently. At any rate disease of the mitral valve commences sometimes that of the aortic in the natural sequence. There is nothing unusual in the sequel. Death results from 35-60 per cent.
Kidney Diseases

These are rare among the miners; and for the simple reason that they are sober men. Even those who do drink to excess, drink beer for the most part. Amongst the female part of the population who drink to excess, kidney diseases are much more common, for they unfortunately take to spirits more frequently. Albuminous urine is frequent enough, but it is most frequently secondary to disease of the valves of the heart. It may be stated that I hold this opinion because I have failed to search for kidney disease. But to this I can answer that the students of Dr. Grange, Stewart & Sanders are not men likely to over look these diseases. I remember to this day a very severe reproach I gave from the latter for not examining the urine as a matter of routine, and immediately afterwards listening to the lucid exposition of these diseases given in our systematic course by the former, such as no otherknown I can give. I am frequently meeting with kidney diseases, but not among the miners. In account of the daily warm washing with every shouts when work is over, the skin acts freely, and leads to Changes of Temperature very readily. I am frequently astonished as the readiness with which a mine will strip the skin in my surgery for examination, and stand for a length of time without discomfort. And yet many of these men wear in places having a high temperature. They are frequently subjected to sudden alterations of temperature without detriment or injury. But the skin is clean & sensitive, it performs its duties well, and the kidney are relieved as much as the skin can. So that as the result of employment or habit, primary kidney diseases are rare. When come to speak of observations I got with great activity of urine, I shall have occasion to mention kidney diseases again.
Accidents.

In connection with work in pits one naturally thinks of these as the first and most important work of the engineer. But I have found that accidents are not nearly as common as one would suppose. The condition of the workings at Parkfield are favourable to the occurrence of accidents, and yet accidents are by no means common events. The condition of the roof is very uncertain; and this has led to most of all the unavoidable accidents occurring in my time. Experience teaches both employers and managers how to avoid accidents and regulations are made to obviate such accidents, and to accurately judge to the circumstances, that it is always carried out faithfully by the workmen, an accident is almost impossible. I can confidently assert that if each workman carried out faithfully and to the fullest the rules drawn up for their safety, there is no more danger in a mine than upon the surface of the ground. And I can also assert that the rules are not usually broken through ignorance, but through sheer want of habit and foolishness. Take as examples the following. A man ten years of age, and to his work all his life, got a severe injury to his head, including fracture of the outer table of the frontal bones by a fall from the roof. He took out one prop to put in place of the prop, because it was handy time to stop, and he would get another prop when he went up. Lagging in this case was the cause of this misfortune, and yet he knew, if found out, he would be fined. Another old man lost his life through going into a place before it was pronounced safe by the overseer. Another boy lost his life through attempting to go through an old unused passage which was known to be dangerous, and was warned by a notice-board not to go there. I could multiply examples of accidents both great and small caused simply by non-observance of regulations which are signed by the employees before they are allowed to enter the works.
There are many curious accidents happening to mine, and a collection of them on a large scale might be instructive. But that would be beside the mark. Simple fractures are commonly caused by direct violence, and contusion of soft parts is general. But they unite kindly well. Compound fractures are not uncommon; with care in adjustment of parts and absence of meddling they do well. Compound fractures are difficult to deal with; for the wounds are deep, and the soft parts are in the case severely injured. But antiseptic dressing are near the less often successful. Nothing surprises me more than the success attending the antiseptic treatment of compound fractures. I rigorously adhere to the principles I was taught at Ledo, leaving the detail as required. I still use the old-fashioned carbolic acid, both for cleansing wounds, for dressings, and in sprays. And I do not know that any antiseptic can produce better results. Of 13 compound fractures in all among collie's I have had perfect bony union in everyone. They were just above the wrist, joint above the ankle, one of the humerus, the others of fingers and metacarpal. Now I mean therefore to adhere to the use of this old antiseptic in old-fashioned method, quite like I have acquired more confidence in the use of the newer ones. It is quite possible that sheer ignorance of dangers enabled me to act fearlessly & confidently; but at any rate I did what I was taught to do.

What I have said as to compound fractures applies to the treatment of the usual dog wounds of soft parts. But in many of them cases destruction of tissue supposes its separation, and the wounds are long in healing.
Somehow or other I got in bred at Edinburgh with the idea that mine's mydriasis was a common ailment among clerks. But as I have had only three cases, of the clerks in have been disquieted by that erroneous impression. Every one of these cases worked on coal in a recumbent position with a candle light; and every one has completely lost the mydriasis after six months' rest in the free open light above fires. I have not observed that any treatment has benefited the patient beyond change of circumstances. I rest content of the three cases have gone back to pian, but not to work on coal. I am of opinion that the position of the workman is an important element in causation. And I am also of opinion that change of circumstances is the only thing that will benefit the patient. While speaking of position I must exclude any complication with brain disease. I have as present under care a mine who has mydriasis complicated with a brain lesion — probably eumellar. The mydriasis has continued over ten months in the same condition. I am not prepared to state in these circumstances whether or not the brain lesion has any causal relation to the mydriasis. But I quite believe that the phenomena of mydriasis means by working in an imperfect light in the recumbent position and that if taken in time the phoe effects will cease on change of circumstances. The light has remained good and the muscular tremors have lasting ceased after rest alone. It seems to me that there is a great deal of surprised talk upon this subject. I have just met with an Edinburgh graduate from a mine practice in Durham who says it is comparative rare; and that the case are invariable cured by taking a rest in the open air and lights.
I come now to the rare chloasma, which are difficult. A

group owing to imperfect knowledge. I first will mention


goitre. Swelling of the thyroid gland is common, though one would not


say prevalent. As a rule they are not large, they affect the whole thy-


roid and occur almost all in one district where the water contains much


calcite & magnesia. In all cases, some members of the same family

differ from other cases, others from oneself. The few cases of go-


thamic goitre I have seen also occurred in the same district, but they


only involved one lobe of the gland, or one lobe of the thymus, and never


any notable age. I am quite aware of the danger in using such a

generalization. But the observation of a few facts always occurring to


goitre is apt to lead to an impression, correct or otherwise, and if


not to conclusion, the impression points to the necessity of further


inquiry. I have mentioned in the above group four chloasmas which


are not usually all considered to be related to each other. The


first, however, have a decided predilection to affect the heart, two


of them the endocardium, and two of them the nervous structure more


especially. Of the group of four we have two affecting the structure of


the thyroid, and both more prone to occur in families of rheumatic di-


athesis, and the whole of them occurring in a district supplied with hard


water. I cannot see that soil has or ground air has much to do with the


production of these diseases, for the soil varies, & the subsoil still


more so. But in all cases, it is damp, and as the rock is not in any


case far below, the ground water level is one to vary with rain &


season. I am quite aware that the relation of hard water to goitre


has been denied; but as far as I know, those who assert the


connection have taken more trouble to obtain possessing of


positive facts, than those who deny it. But I do not know that


rath thalamie goitre has any thing like a constant connection
with the custom of drinking hard water. So far my cases have all occurred in such a district, and they have all occurred in rheumatic families.

Mental derangement in each case preceded the development of the palpitation, which I always find the earliest of the three main symptoms to arise. In two cases slight mental alienation (acute melancholia) preceded the palpitation; and on the development of the latter, the former disappeared. In connection with these two cases, (two females, both in law one 24 years, the other 37 at death) I observed that with the stoppage of menstruation, involution of the external organs of generation to some extent occurred; the hair from the pubis entirely disappeared. I did not observe the same in the males; but in each case enureticfulness existed. However I am departing from my subject, and I should not have mentioned the matter, but I do not believe in an isolated fact, and I would like to know the connection between these two in goitre. I should also point out here, that I am convinced there is a more or less pronounced family connection between goitre, Graves' disease, &c., and that the rheumatic diathesis has something to do with the nervous viscosity underlying them. And this is proved to some extent by the fact that aconite & stramonium, combined have had in my experience a better influence on the duration & course of these diseases than any other drugs. Letting them into their surroundings & the use of soft pure water have seemed to do some good in all these diseases. I will leave the matter here at present, but I mean as opportunity occurs, to investigate the matter and either prove or disprove my present position.

In speaking of hard water, it might be thought that calculi of the kidney, bladder would be common, but such is not the case, and among the miners I have not had one simple case. The amount of fluid they take may have something to do with that.
The three worms, Tænia solium, oxyuris vermicularis & ascaris lumbricoides used to be very common, but since the introduction of water supply other than the old well, they are less common than before. Now the worm they are more prevalent the I ever saw them in Scotland. Partially cooked red meat is very much relied on, but it seems that the use of cold water had more to do with their prevalence than the meat. Tænia mediae cancellata is not as common.

Of skin disease, the most common are itch and eczema. Only the first gets the latter among miners, and it is rare. Of the few obstinate & more general cases, probably constitutional in origin, the bath in mineral waters has made much improvement, and cure not. When itch arises in a mine, it takes a long time to completely eradicate it. It ameliorates, because owing to the efficient daily general ablution of the whole body, it is never allowed to assume prominence and does not come under treatment.

Impetigo faeces infection, nature is sometimes seen among the dust, but cleanliness and antiseptic treatment soon stops its spread.

General diseases are not common, as miners usually marry young; and asphixia, with its sequelae and results are seldom seen. Possibly early retirement & early rising, being the rule, leaves little time for the after-dark ories, indulged in by young men, and the condition of excitement of the nervous system induced by alcohol or opportunities is absent.

There is a great deal more to mention in connection with the life, such a body of men as Parysized miners, and I have no doubt a good deal of what I have said has been modified by others experienced in the nearest hood. And rather than try to
Sum up what I have written, I would not claim my impressions as they are. But in conclusion I would point to a fact which must have become apparent to any one reading this thesis. The Parkfield mine is a man on a higher moral level than the average mine; and therefore his physical condition is better. Now this is due largely to the influence of Mr. Corsham, the late owner, who lived for many years amongst the men. He was a man of strong religious convictions, and a crammed tutor, and moreover he was a fine platform speaker—quite an orator. For many years he used the influence of his position and his convictions to ameliorate the condition of his employees, and he soon had an army of sincere workers helping him amongst the men themselves. If other owners would take the trouble to do likewise, I have little hesitation in saying that the collier would be a self-respecting man, would tend to his family and home, would be more contented with his position, and would be easily influenced to avoid the strike, which strikes hard on the success of the industries of the country. While the owners keep aloof, the men know them not, and suspect them of pandering to self-interest alone, cannot believe in any just remuneration they may make. If the owners would keep in close touch with the men, both would be benefited morally, physically and economically, and the demagogic leaders of trade unionism would find their occupation gone. This applies all round, but such a millennium of industry is yet far away. I am afraid it is far off, and will not arrive, except as part of the general hygienic millennium, of which I hope it is pardonable to dream.